

Surgical Techniques In Tonsillectomy – A Comparative Analysis Of Cold Steel Dissection And Bipolar Diathermy

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Abstract

Objective: To compare intra-operative blood loss, operative time and postoperative pain scores with cold steel dissection technique versus bipolar diathermy technique in tonsillectomy at our institution.

Method: Seventy-four patients aged 5–35 years of either gender planned for elective tonsillectomy under general anaesthesia were included. Patients were divided into two groups. In group C, the cold steel dissection technique was used while in group D bipolar diathermy technique was used for tonsillectomy. All patients were evaluated for intra-operative blood loss, operative time and post-operative pain. Data was entered and analyzed in SPSS version 20.0. P- A value less than 0.05 was considered significant.

Results: The mean operating time was 28.16 ± 0.27 minutes in Group C and 21.4 ± 2.34 minutes in Group D. Intra-operative blood loss was 90.76 ± 2.02 ml in Group C and 17.38 ± 3.1 ml group-D. The post-operative pain score was 6.89 ± 0.32 in group C and 6.92 ± 0.27 in group D.

Conclusion: The bipolar diathermy technique is superior to the cold steel dissection technique in terms of intra-operative bleeding and operative time but at the expense of a higher post-operative pain score

MeSH Keywords: Tonsillectomy, Surgical diathermy, post-operative pain, bleeding.

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1. Introduction

The secretion of IgA antibodies by the tonsils is a crucial part of the defence system. Occasionally the tonsils get infected due to a breakdown in the defense system, resulting in severe sore throat, fever, and other issues that need tonsil removal. This necessitates the diseased tonsils being removed.¹

Tonsillectomy, the surgical removal of the tonsils, is one of the most popular surgical procedures. For otorhinolaryngologists, tonsillectomy is a basic surgical procedure. It was initially documented 3000 years ago, concerning Hindu medicine about 1000 years B.C. Various techniques are currently used for tonsillectomy.^{2,3}

The two main components of morbidity after tonsillectomy are pain and bleeding after surgery. Postoperative pain is an essential component which adversely impacts oral feeding and quality of life. It may be related to mucosal cutting, damage and exposure of glossopharyngeal nerve fibres, pharyngeal muscle spasm, heat injury, and inflammation. Numerous techniques have been reported, and they are often compared in the literature.⁴

The 19th century witnessed the introduction of the cold steel dissection technique. For over a century, the gold standard for tonsillectomy was a time-tested method of cold dissection.⁵ When performing a cold steel dissection, the tonsil is held medially as the anterior pillar is cut open and the tonsil is separated from the superior pole until it reaches the inferior pole, which is ligated.⁶ Numerous developments have occurred in this surgical procedure.

Bipolar diathermy was first proposed over 40 years ago. Crucially, even though diathermy is often used for both tonsillar dissection and hemostasis, it can only be used to secure hemostasis after a traditional cold steel dissection. Diathermy is the term used to describe the use of high-frequency electromagnetic currents or electrically produced heat in surgical and physical therapy procedures.⁷

This research sought to assess the intra-operative blood loss, operative time and postoperative pain associated with tonsillectomy with cold steel dissection and bipolar diathermy technique so that better techniques could be adopted to decrease procedure-related morbidity in patients.



2. Materials & Methods

This prospective cohort study was conducted at Railway Hospital Rawalpindi from July to December 2023. By using the OpenEpi sample size calculator sample size of 74 (37 in each group) was calculated keeping a 95% confidence level, 80% power of study, mean pain of 6.78 ± 1.1^{11} with bipolar diathermy technique and 6.12 ± 0.9^{11} with cold steel dissection technique. Approval from the institutional ethical review committee was obtained. Non-probability consecutive sampling technique was used. Patients with chronic tonsillitis undergoing elective tonsillectomy under general anaesthesia were included in the study. Patients with peritonsillar abscess, acute tonsillitis or asymmetric tonsillar hypertrophy were excluded. Informed written consent was taken from all patients. Patients were divided into two groups by lottery method. In group C tonsillectomy was performed with cold steel dissection technique while in group D bipolar diathermy technique was used. All surgeries were performed by a single surgeon to avoid bias. Intra-operative blood loss, operative time and postoperative pain score (Visual analogue Scale) were assessed in each patient. All information was collected on performance by a blindfolded pre-trained team member.

Data was entered and analyzed in SPSS version 20.0. Mean and standard deviation were calculated for quantitative variables like age, operative time, intra-operative bleeding and postoperative pain score. Frequency and percentage were calculated for qualitative variables like gender. An Independent sample t-test was applied to compare the two groups. P- A value less than 0.05 was considered significant.

3. Results

The age range in this study was from 5 to 35 years. The mean age was 25.89 ± 4.48 years and 26.27 ± 4.67 years in group C and group D respectively. Both genders were included in the study as shown in Table 1.

Table 1: Age and gender distribution for groups (n=74).

		Group C (n=37)	Group D (n=37)
Gender	Male	23(62.1%)	25 (67.5 %)
	Female	14 (37.9%)	12 (32.5 %)
Age in years	Mean \pm SD	25.89 ± 4.48	26.27 ± 4.67

Mean operative time was 28.16 ± 0.27 minutes in group C as compared to 21.4 ± 2.34 minutes in group D

showing a significant difference (p-value: 0.000). Intra-operative mean blood loss was 90.76 ± 2.02 ml in group C as compared to 17.38 ± 3.15 ml in group D showing significant difference (p-value: 0.000).

Table 2: Mean Operating Time and intra-operative blood loss

	Group C (Cold steel dissection technique)	Group D (Bipolar diathermy technique)	P Value
Mean Operating Time (minutes)	28.16 ± 0.27	21.4 ± 2.34	0.000
Mean Blood Loss during surgery (ml)	90.76 ± 2.02	17.38 ± 3.15	0.000

A comparison of postoperative pain scores between the two groups is shown in Table 4. A significant difference was present at 24 hrs post-operatively (p-value: 0.038).

Table 3: Mean Post-operative pain scores (VAS) in both groups

	Group C (Cold steel dissection technique)	Group D (Bipolar diathermy technique)	P- Value
Pain at recovery	6.89 ± 0.32	6.92 ± 0.27	0.696
Pain at 6 hours	5.84 ± 0.69	5.95 ± 0.33	0.391
Pain at 12 hours	4.78 ± 0.42	4.86 ± 0.35	0.395
Pain at 24 hours	3.22 ± 1.58	3.78 ± 0.41	0.038

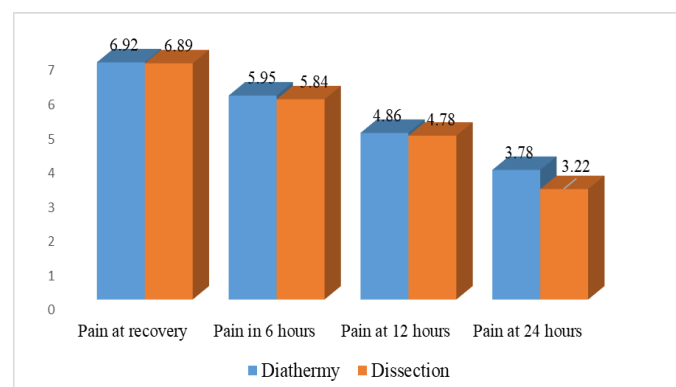


Figure 1: Bar graphs showing mean Post-operative pain in both groups

4. Discussion

Tonsillectomy makes up one of the routinely performed surgeries conducted by otolaryngologists. Currently, available methods for performing tonsillectomy include coblation, laser surgery, diathermy dissection, cold steel dissection, and cryosurgery.

A study by Mirza et al. showed a mean operative time of 21.7 ± 2.1 minutes with bipolar diathermy and 28.4 ± 2.4 minutes with the cold steel dissection technique.⁸

Another study exhibited mean durations of surgery with bipolar diathermy and the Cold Steel Dissection technique as 11.75 ± 6.76 and 21.75 ± 6.23 minutes, respectively.⁹ Additionally, Shafiul Islam et al. reported that with the bipolar diathermy technique, the mean operative time was 16.75 minutes, while it was 24.50 minutes with the cold steel dissection technique.¹⁰ Our study showed similar findings.

A study by Niaz et al showed mean intra-operative blood loss as 11.17 ± 1.67 ml in the bipolar diathermy group as compared to 24.57 ± 1.42 ml in dissection groups.¹¹ Another study showed mean blood loss as 16.70 ± 4.70 ml in the electrocautery group and 50.70 ± 30.50 in the cold steel dissection group.¹² Our study also showed a significant difference in this aspect.

In our study, post-operative pain scores were higher in the bipolar diathermy group. Another study also showed increased post-operative pain with bipolar technique.¹³ However, in a study by Sharma and colleagues, there was no significant difference in pain intensity between the two techniques.¹⁴ Varadharajan et al,¹⁵ explain that greater power level, duration, and frequency of cautery application might be the cause of increased post-operative pain after bipolar diathermy. Using bipolar forceps for the whole dissection might cause additional tissue damage and heat injury, which would slow down the healing process and make the post-operative recovery more painful.¹⁵

5. Conclusion

The bipolar diathermy technique is superior to the cold steel dissection technique in terms of intra-operative bleeding and operative time but at the expense of a higher post-operative pain score

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Contributions:

N.A.K, A.S, N.A- Conception of study

- Experimentation/Study Conduction

M.D.S, M.A, I.I - Analysis/Interpretation/Discussion

N.A.K, M.D.S, N.A - Manuscript Writing

M.A, A.S, I.I - Critical Review

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